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Docket No. ZAY-99-039

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

JC571 U.S. PTO
02/16/00

In re Application of:) Art Unit:
Erik P. Staats)
Serial No. [Not yet assigned])
Filed: February 16, 2000)
For: "TRANSMISSION OF AV/C)
TRANSACTIONS OVER MULTIPLE)
TRANSPORTS METHOD AND)
APPARATUS")

JC639 U.S. PTO
09/505385
02/16/00

CERTIFICATE OF MAILING

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Date Linda D. Barron

TRANSMITTAL LETTER

Honorable Assistant Commissioner
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Sir:

Enclosed for filing please find the patent application for an invention entitled,
"TRANSMISSION OF AV/C TRANSACTIONS OVER MULTIPLE TRANSPORTS
METHOD AND APPARATUS", filed on behalf of Zayante, Inc., assignee from inventor
Erik P. Staats, including eighteen (18) pages of specification, four (4) pages of claims, six
(6) sheets of drawing figures, and 1 page of Abstract. Also enclosed herewith are the
Declaration & Power of Attorney, Recordation Cover Sheet, Assignment and Verified
Statement Claiming Small Entity Status.

The attorney's Docket Number is ZAY-99-039.

Kindly address all communications regarding this application to:

Victor J. Gallo
Sierra Patent Group, Ltd.
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Telephone (775) 586-9500

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A check in the amount of \$424.00 is enclosed for the filing fee for a small entity, calculated as follows:

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| Basic Filing Fee: | \$ 345.00 |
| One Additional Independent Claims: | \$ 39.00 |
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In the event any variance exists between the amount enclosed and the Patent Office charges for filing the above-noted documents, the Assistant Commissioner is hereby authorized to charge or credit the difference to our Deposit Account No. 50-0612. A duplicate of this page is enclosed.

Respectfully submitted,
Sierra Patent Group, Ltd.

Dated: February 16, 2000



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Serial or Patent No.: Not yet assigned

Filed or Issued: Not yet filed

For: **"TRANSMISSION OF AV/C TRANSACTIONS OVER MULTIPLE TRANSPORTS METHOD AND APPARATUS"**

**VERIFIED STATEMENT (DECLARATION) CLAIMING
SMALL ENTITY STATUS (37 C.F.R. 1.9(f) and 1.27(c))
SMALL BUSINESS CONCERN**

I hereby declare that I am

the owner of the small business concern identified below:

an official of the small business concern identified below and empowered to act on its behalf.

NAME OF BUSINESS: Zayante, Inc.

ADDRESS OF BUSINESS: 269 Mt. Hermon Road, Suite 200, Scotts Valley, California 95066

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly one concern controls or has the power to control the other, or a third-party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed, to and remain with the small business concern identified above with regard to the invention, entitled:

"TRANSMISSION OF AV/C TRANSACTIONS OVER MULTIPLE TRANSPORTS METHOD AND APPARATUS"

by inventor(s): Erik P. Staat

described in:

the specification filed herewith

application serial No. Not yet assigned, Not yet filed.

patent No. _____, issued _____.

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below and no rights to the invention are held

This application is submitted in the name of inventor Erik P. Staats, assignor to Zayante, Inc., a California Corporation.

5

SPECIFICATION

10

TRANSMISSION OF AV/C TRANSACTIONS OVER MULTIPLE TRANSPORTS 15 METHOD AND APPARATUS

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BACKGROUND OF THE INVENTION

1. Field of the Invention

25 This invention relates to implementing Audio/Video Control (AV/C) device communication systems, as in the AV/C Digital Interface Command Set specified by IEEE 1394. More particularly, this invention relates to techniques for implementing the AV/C data packets over multiple transports. Application of this invention may especially be found in the realm of IEEE 1394 systems and applications.

2. The Prior Art

The IEEE 1394 multimedia bus standard is to be the "convergence bus" bringing together the worlds of the PC and digital consumer electronics. It is readily becoming the digital interface of choice for consumer digital audio/video applications, providing a simple, low-cost and seamless plug-and-play interconnect for clusters of digital A/V devices, and it is being adopted for PCs and peripherals.

10 The original specification for 1394, called IEEE 1394-1995, supported data transmission speeds of 100 to 400 Mbits/second. Most consumer electronic devices available on the market have supported either 100 or 100/200 Mbits/second; meaning that plenty of headroom remains in the 1394 specification. However, as more devices are added to a system, and improvements in the quality of the A/V data (i.e., more pixels and 15 more bits per pixel) emerge, a need for greater bandwidth has been indicated.

The 1394a specification (pending approval) offers efficiency improvements, including support for very low power, arbitration acceleration, fast reset and

suspend/resume features. However, not all devices meet the 1394 specification and not all devices communicate by way of the same protocols.

The AV/C control protocol was designed to operate over the Function Control

5 Protocol (FCP) transport via an IEEE-1394 bus. There is no implementation for the AV/C control protocol over any transport other than FCP. The old method of implementing the AV/C protocol assumes a single transport, FCP, and uses direct calls to the FCP transport implementation. Thus, current implementations hardwire the AV/C control protocol layer to the FCP transport layer. If another AV/C transport layer were defined, these 10 implementations would have to be redesigned.

The current AV/C transport layer, FCP, is a rather low performance transport

protocol. While initially AV/C was designed as a low speed protocol for controlling AV devices such as camcorders, it is now being used as a file system protocol for AV storage 15 devices such as AV disk drives. This new use will require a higher performance transport protocol for applications such as home AV servers. Such transports may be asynchronous connections or Serial Bus Protocol (SBP) connections.

In addition, certain standards bodies, such as the Video Electronics Standards Association (VESA), are specifying the transport of AV/C via IP over non-1394 networks such as ethernet. Current implementations of the AV/C protocol will not only need to support transports other than FCP but will need to simultaneously support 5 multiple transports for AV/C control of devices with different transport capabilities. Thus, a method is required for separating the AV/C protocol implementation from the AV/C transport implementation and that also supports multiple transports running simultaneously.

10 It is therefore desirable to overcome this shortcoming by providing a means for devices to communicate with one another without regard to protocols or connectivity. This is especially true today, when users of such devices have an ever-growing desire to couple all types of audio/video equipment to their personal computers for instance. However, at present there is no convenient means for enabling multiple such devices to 15 communicate one with the others. That is, a user may be able to connect a video camera to a computer if they have the appropriate cables and protocols. However, if that user wishes to connect an A/V system to a computer network and a video camera, matters are far more difficult, if not impossible in many instances.

BRIEF DESCRIPTION OF THE INVENTION

To overcome these and other shortcomings of the prior art, this invention separates

5 the implementation of the AV/C protocol from the implementation of the AV/C transport.

In addition, it allows the transport of AV/C commands over more than one transport

simultaneously. Thus, this invention allows the AV/C protocol implementation to

communicate over higher performance transports such as asynchronous connections or

SBP and non 1394 transports such as IP over ethernet or various wireless transports. This

10 invention also allows the AV/C protocol to operate over multiple FCP transports that may

exist over multiple 1394 networks connected to the same node.

This invention separates the implementation of the AV/C protocol layer and the

AV/C transport layer. This invention defines an AV/C transport controller as a software

15 plug-in that provides AV/C transport services to the AV/C protocol layer. The AV/C

transport services provided by the AV/C transport controller abstract the implementation

of the particular AV/C transport. The services are the same regardless of the type of

transport (FCP, asynchronous connections, SBP, ethernet, etc.).

Each AV/C transport controller may control multiple transport instances (or transports). For example, a node containing two 1394 link interfaces and an AV/C FCP transport controller would have two instances of AV/C FCP transports.

5

For each available AV/C transport, the AV/C protocol layer maintains an AV/C transport reference. For each device with which it communicates, the AV/C protocol layer associates an AV/C transport reference indicating both the AV/C transport controller and the specific AV/C transport instance used to transport AV/C commands to the device.

10

Each AV/C transport controller is responsible for enumerating the available AV/C transport instances. For each available transport instance, the AV/C transport controller creates an AV/C transport reference and presents it to the AV/C protocol layer.

15

The set of AV/C transport services provided by an AV/C transport controller include handling of requests to transmit an AV/C command or response, indication of

receipt of AV/C commands or responses, and indication of new devices able to communicate over the AV/C transport.

It is therefore an object of the present invention to provide a system for
5 communicating AV/C data packets between devices without regard to protocols.

It is another object of the present invention to provide a method for transmitting
AV/C transactions over multiple transports without regard for protocols.

10 It is yet another object of the present invention to provide a system for transmitting
AV/C data across an IP or other non-FCP network.

Viewed from a first vantage point, an AV/C transaction data delivery system is
disclosed, comprising in combination at least one transport controller; an AV/C transport
15 layer in operative communication with the at least one transport controller; and an AV/C
protocol layer in operative communication with the AV/C transport layer, the AV/C
protocol layer including means for sending AV/C transaction data over more than one
transport.

Viewed from a second vantage point, a method for establishing transport routing information in an AV/C transaction data delivery system is disclosed, comprising in combination detecting a transport; creating a transport ID associated with the transport; 5 notifying a transport layer of the transport ID; indexing the transport ID; associating the indexed transport ID with a device.

Viewed from a third vantage point, a method for sending AV/C transaction data in an AV/C transaction data delivery system is disclosed, comprising in combination 10 receiving AV/C transaction data for transport; associating the AV/C transaction data with a transport ID; providing the AV/C transaction data and transport ID to a transport layer; associating the transport ID with a transport controller bus ID; and providing the AV/C transaction data to a transport controller data record associated with the bus ID.

15 Viewed from a fourth vantage point, a method for receiving AV/C transaction data in an AV/C transaction data delivery system is disclosed, comprising in combination receiving AV/C transaction data by a transport controller and associating the data with a link ID; converting the link ID to a data record and a bus ID; providing the bus ID and

the data to a transport layer; associating the bus ID with a transport ID; and providing the transport layer ID and data to a protocol layer.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

5

FIG. 1 is a schematic diagram of an exemplary physical illustration of the present invention.

10 FIG. 2 is a block diagram of one embodiment of the present invention.

FIG. 3 is a schematic diagram of the AV/C Transaction Data Delivery System of the present invention.

15 FIG. 4 is a flowchart of the method of establishing transports and identifiers for the transports of the present invention.

FIG. 5 is a flowchart of the method of sending AV/C data packets of the present invention.

FIG. 6 is a flowchart of the method of receiving AV/C data packets of the present invention.

5

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Persons of ordinary skill in the art will realize that the following description of the present invention is illustrative only and not in any way limiting. Other embodiments of the invention will readily suggest themselves to such skilled persons having the benefit of 10 this disclosure.

10

Referring now to the drawing figures wherein like reference numerals denote like parts throughout the drawing figures, figure 1 is directed to an overview 100 of the present invention. Depicted is a network 100, including a centralized computer network 15 utilizing the Internet Protocol (IP) over ethernet, and a first AV/C device in the form of a video camera 112, and a second AV/C device in the form of a television 114. The AV/C devices 112 and 114 are likewise connected to the network as will be described in greater detail below.

Devices on the centralized computer network include devices readily recognized by persons of ordinary skill in the art, such as computers 116, and servers 118. Also included on the network 100, however, are video camera 112 and television 114.

5 Although these devices do not normally operate via IP, they are connected to the network, nonetheless, via bridges 120 and 122. That is, one side of bridge 120 is connected to ethernet media, while the other side is connected to 1394 media and thereafter connected to video camera 112. Likewise, one side of bridge 122 is connected to an ethernet link, while the other side is coupled to a 1394 link and thereafter to 10 television 114.

Interestingly, video camera 112 normally communicates via the FCP protocol, while television 114 normally communicates via SBP. However, the bridges 120 and 122 allow AV/C devices 112 and 114 to communicate across the network 100 regardless of 15 what would otherwise be protocol incompatibilities. Although this embodiment depicts bridges 120 and 122, it should be readily appreciated that the functionality to be described hereinafter of the internal workings of these bridges may in fact be contained within AV/C devices 112 and 114 or similarly fashioned to achieve the same result.

To understand how this communication is accomplished, reference is now made to figure 2 wherein reference numeral 10 is directed to an exemplary block diagram of the present invention. Initially, an overview of data paths will be discussed for this system 10 5 and thereafter, further detail will be provided with regard to data handling.

In particular, an AV/C data packet or transaction data 12 to be transmitted via this system will first be presented to AV/C protocol layer 14. AV/C protocol layer 14 will then direct the data packet 12 to one of the several transport instances 24, 26, 28, 30, or 10 32 as will be understood and coordinated by AV/C transport layer 16. Thereafter, in a manner that will be understood by one of the depicted controllers 18, 20, and 22, the AV/C transport layer will direct the transport indicated by the protocol layer's direction to pass the data packet 12 on to the proper transport instance.

15 Significantly, during this passing of data between the above mentioned layers 14 and 16 and onward to controllers 18, 20, and 22, the protocol layer will have no information regarding downstream protocols. Rather, protocol layer 14 will only be privy to transport types and destinations. In this manner, the AV/C device sending the data

packet 12 need not communicate via a specified protocol, nor will it be limited to a specified path.

For example, an AV/C data packet 12 directed to a device (not shown) on the 5 ethernet media would be directed by AV/C protocol layer 14 to such device by including the ultimate device subunit information (known in AV/C systems) along with the data packet via the ethernet transport controller 22 and the transport instance 32 associated therewith. That is, from the point of view of protocol layer 14 the device that it is trying to send the packet to lies on that transport path. That is all the protocol layer knows. The 10 transport layer 16, upon receipt of the data packet from the protocol layer along with the transport direction, assists the protocol layer by directing the data packet more specifically, as it is privy to additional information regarding the AV/C Ethernet IP Transport Controller 22. In this manner, the data packet may be guided to the appropriate transport instance 32 which understands how to properly communicate via the ethernet 15 path 34.

Likewise, if the data packet 12 were directed instead to a device (not shown) connected to either of the 1394 bus interfaces 36 or 38, any appropriate transport 18 or 20

and any appropriate transport instance 24, 26, 28, or 30 may be utilized. For instance, if the device to be communicated with is connected to the bus 36 and utilizes the SBP protocol, transport controller 20 and transport instance 28 would be indicated for such a data transmission. On the other hand, if the device to be communicated with is connected 5 to bus 38 and prefers FCP, then transport controller 18 and transport instance 24 would be indicated.

With this overview in mind, reference is now made to figure 3 and AV/C transaction data delivery system 40. First will be described the assigning of transport path 10 information to facilitate transport of data. Upon detection of a new transport bus by a particular AV/C transport controller 56 amongst the transport controllers 50, and referring now also to figure 4 and method 60, the detecting controller creates a transport bus identification 54. Of course, each controller 56 may identify more than one transport 15 bus connected thereto, and for each, a bus ID 54 is created for that particular controller 56.

The detecting controller 56 likewise associates the assigned bus ID 54, such as B1, with the link device (not shown) to which the bus detected is associated. In this manner,

when a message is directed to that bus, the controller will utilize the appropriate link for transport of the message. The bus ID 54 is thus stored in a data record by the controller 56 in a memory space for future retrieval. Furthermore, the controller 56 will notify the AV/C transport layer 48 of the new bus ID 54 and of the data record reference pointer so 5 that the transport layer 48 may direct data for that bus ID 54 appropriately in the future.

The transport layer 48 then assigns a transport instance 52, such as T21, and associates it with the bus ID 54 (B1 for controller 2 in this illustration). Thereafter, the transport layer notifies the AV/C protocol layer 46 of the new transport instance 52. The 10 AV/C protocol layer 46 then associates the new transport instance 52 with a device, such as D3. It should be noted that one of the exalted features of the IEEE 1394 standard is the ability to autodetect devices and hot swap those devices as needed. Therefore, associating such device information with the transport path is deemed sum and substance of an AV/C system utilizing IEEE 1394 interfaces.

15

In this manner it can be understood that the only information that the protocol layer 46 retains is that of transport type and instance. Therefore, the protocol layer 46 does not require protocol information to send data packets to remote devices. Rather, the

protocol layer need only know which transport instance is associated with which device, and data may be sent accordingly. The set of AV/C transport services provided by an AV/C transport controller include handling of requests to transmit an AV/C command or response, indication of receipt of AV/C commands or responses, and indication of new devices able to communicate over the AV/C transport. Thus, the transport controller is responsible for associating devices with transport instances. In its new device indication, it gives a device ID and transport ID.

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Upon receipt of an AV/C data packet 12 for transmission to a specified device, and referring now also to figure 5 and method 70, AV/C protocol layer 46 first consults its list of devices and transport correlation's and selects the appropriate transport instance that will be understood by the transport layer 48. The protocol layer 46 then provides the data packet and transport ID 52 to the transport layer 48 for further transmission. The transport layer 48, likewise, consults its lookup table to ascertain which transport controller and bus ID is associated with the transport ID 52 provided by the protocol layer 46. The transport layer 48 then passes the data packet on to the appropriate transport controller at the data record point associated with the bus ID 54 in question. Thereafter, the transport controller 56 executes appropriate software subroutines to transport the

AV/C data packet over the specified transport. For instance, if the data packet in question was being transmitted to a device on an IP path, the data packet may then be wrapped within an appropriate IP packet as will now be appreciated by those skilled in the art having now been provided with the preceding disclosure.

5

On the other hand, and referring now also to figure 6 and method 80, when a data packet 12 is sent to the protocol layer 46, the transmission occurs in the following manner. The data packet is first detected by the transaction layer of the lower level transaction layer of the associated link that the data packet 12 has been sent. Upon receipt of this data, the transport controller 56 converts the link ID to a data record and bus ID in a memory space. The transport controller 56 then provides the data packet along with the bus ID 54 and data record location to the transport layer 48. The transport layer 48 correlates the bus ID 54 with its transport ID 52. The transport layer then transmits the data packet 12 to the protocol layer along with the transport ID 52.

15

Thereafter, upon receipt of this data packet 12 and transport ID 52, the protocol layer attempts to correlate this transmission with a previously sent command. Thus, the protocol layer 46 searches by the transport ID 52 for a matching command packet that

was transmitted on the same transport layer ID 52. In this manner, the protocol layer 46 may thus determine the subunit device from which the data was sent and pass the information upstream to an appropriate resource for final consumption.

5 While embodiments and applications of this invention have been shown and described, it would be apparent to those skilled in the art that many more modifications than mentioned above are possible without departing from the inventive concepts herein. The invention, therefore, is not to be restricted except in the spirit of the appended claims.

What is claimed is:

1. An AV/C transaction data delivery system, comprising in combination:
 - at least one transport controller;
 - 5 an AV/C transport layer in operative communication with said at least one transport controller; and
 - an AV/C protocol layer in operative communication with said AV/C transport layer, said AV/C protocol layer including means for sending AV/C transaction data over more than one transport.

10

2. The AV/C transaction data delivery system of claim 1 further comprising one or more transport instances associated with said at least one transport controller, wherein said transport controller includes means for indexing said transport instances.

15

3. The AV/C transaction data delivery system of claim 2 further comprising a transport instance catalog included within said transport layer, said catalog including means for receiving transport instance information from said at least one transport controller.

4. The AV/C transaction data delivery system of claim 3 further comprising a device-to-transport instance index included within said AV/C protocol layer, said device-to-transport instance index including means for communicating transport instance information from and to said transport layer.

5. A method for establishing transport routing information in an AV/C transaction data delivery system, comprising in combination:

- detecting a transport;
- creating a transport ID associated with said transport;
- notifying a transport layer of said transport ID;
- indexing said transport ID;
- associating said indexed transport ID with a device.

15 6. The method of claim 5 further comprising associating said transport with a link device.

7. The method of claim 6 further comprising creating a data record for each detected transport and storing the transport ID in association with said transport.

8. The method of claim 7 further comprising notifying said transport layer of 5 said data record.

9. A method for sending AV/C transaction data in an AV/C transaction data delivery system, comprising in combination:

receiving AV/C transaction data for transport;
associating said AV/C transaction data with a transport ID;
providing said AV/C transaction data and transport ID to a transport layer;
associating said transport ID with a transport controller bus ID; and
providing said AV/C transaction data to a transport controller data record

associated with said bus ID.

15

10. The method of claim 9 further comprising executing appropriate routines to transport said AV/C transaction data over the specified transport.

11. A method for receiving AV/C transaction data in an AV/C transaction data delivery system, comprising in combination:

receiving AV/C transaction data by a transport controller and associating said data with a link ID;

5 converting said link ID to a data record and a bus ID;

providing said bus ID and said data to a transport layer;

associating said bus ID with a transport ID; and

providing said transport layer ID and data to a protocol layer.

10 12. The method of claim 11 further comprising searching by said transport ID

for a matching previously sent transport ID and the command associated therewith.

13. The method of claim 12 further comprising associating said data with a particular subunit device when said transport ID and a retrievable subunit ID match.

ABSTRACT

Disclosed is a system and method for transmitting AV/C data over one or more transports. Further disclosed is a system and method for transmitting AV/C data over non-FCP communication media. The disclosed system and method includes an AV/C transaction delivery system which operates in conjunction with communicatively coupled AV/C protocol layers, AV/C transport layers, and AV/C transport controllers to effectuate transmission of AV/C transaction data without regard to protocol.

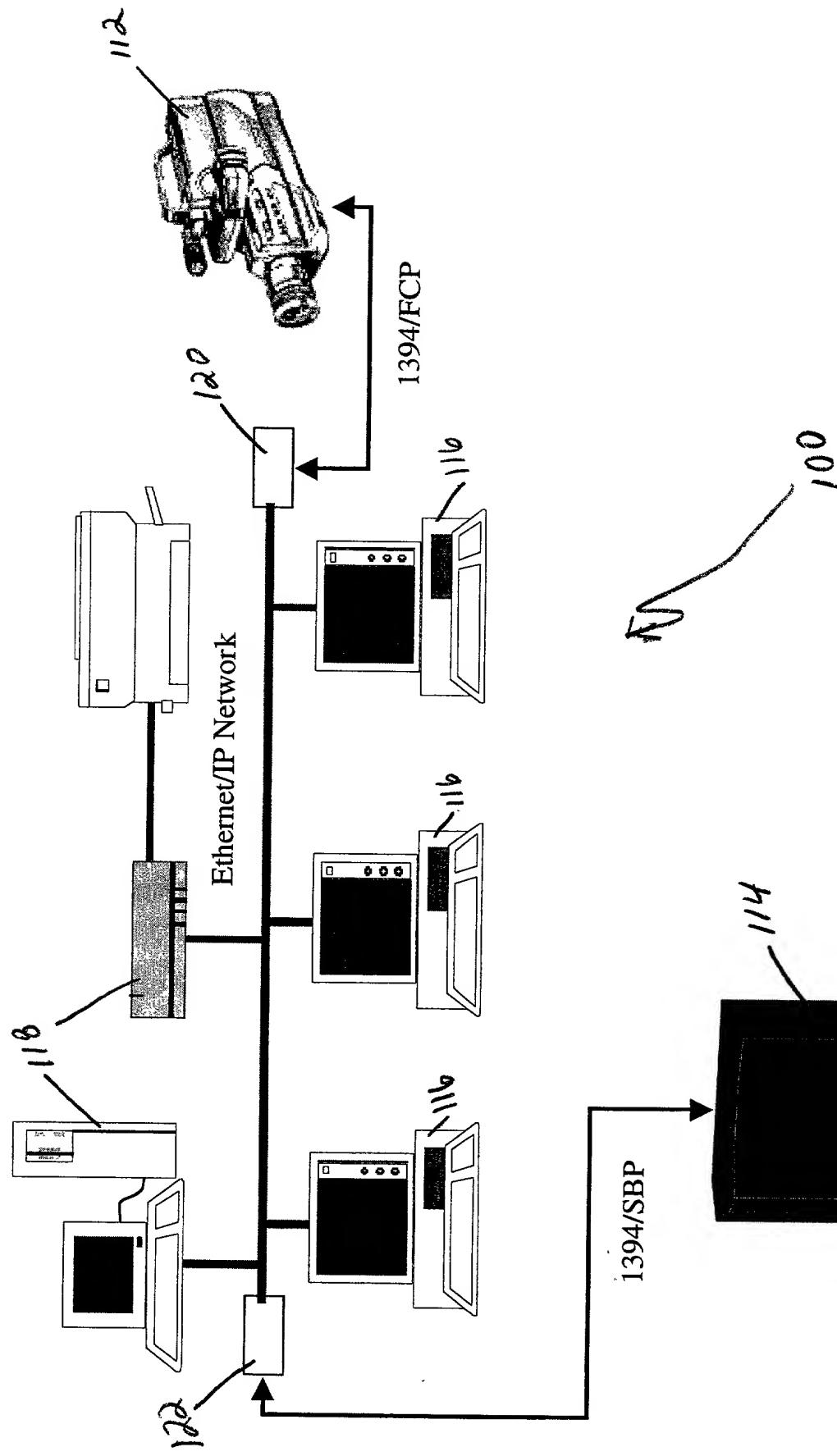


Fig. 1

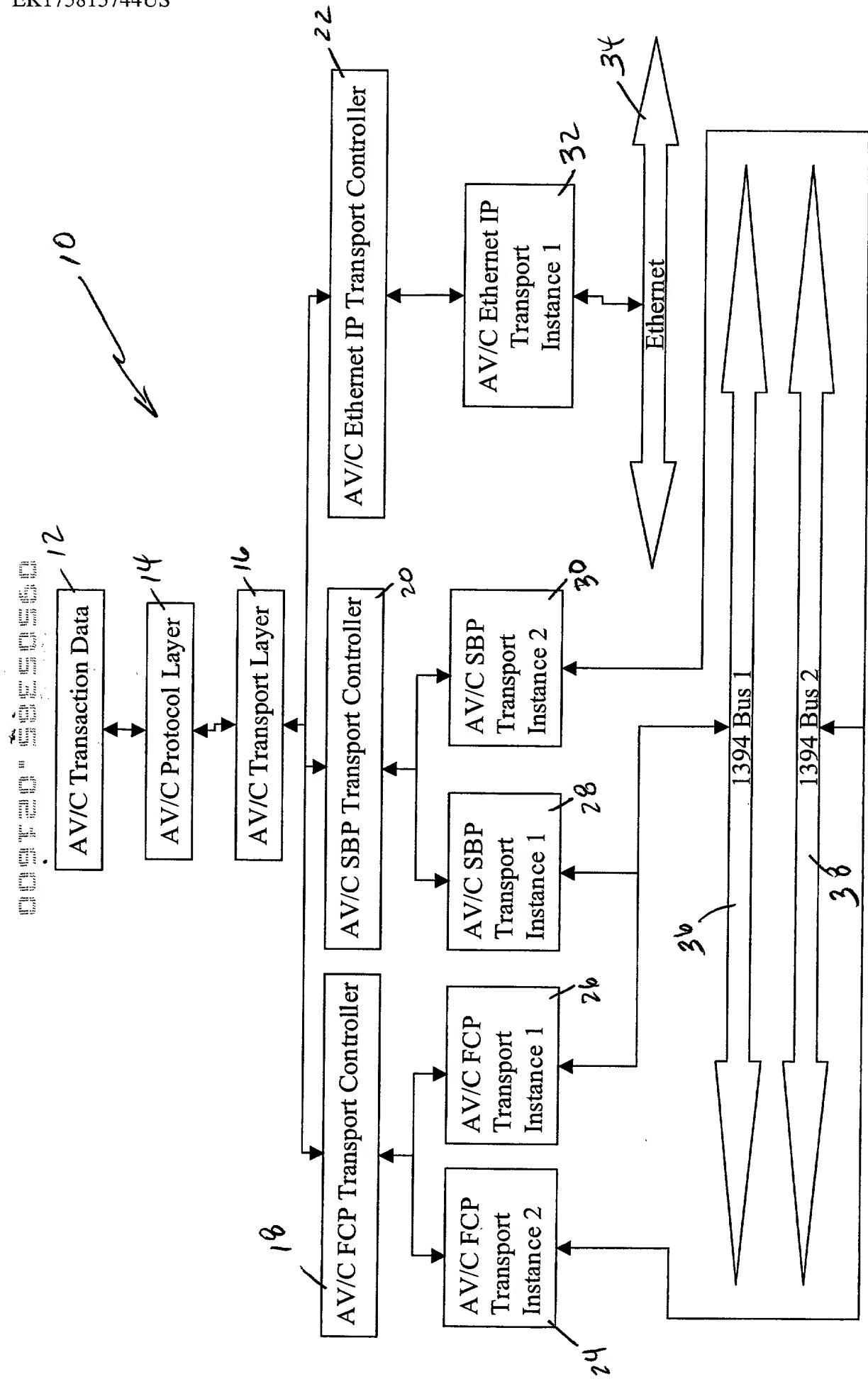


Fig. 2

40
40

| AV/C TRANSACTION DATA DELIVERY SYSTEM | | | | | | | | | | |
|---------------------------------------|--------------|--------|--------------|--------|--------------|--------|--------|--------|--------------|--------|
| AV/C Transaction Data Packets | | | | | | | | | | |
| AV/C Protocol Layer | D1=T11 | D2=T12 | D3=T21 | D4=T31 | D5=T22 | D6=T13 | D7=T32 | D8=T23 | ... | Dn=Tnn |
| AV/C Transport Layer | T11 | T12 | ... | T1n | T21 | T22 | ... | T2n | T31 | T32 |
| AV/C Transport Controllers | B1 | B2 | ... | Bn | B1 | B2 | ... | Bn | ... | ... |
| Controllers | Controller 1 | | Controller 2 | | Controller 3 | | ... | | Controller n | |

FIG. 3

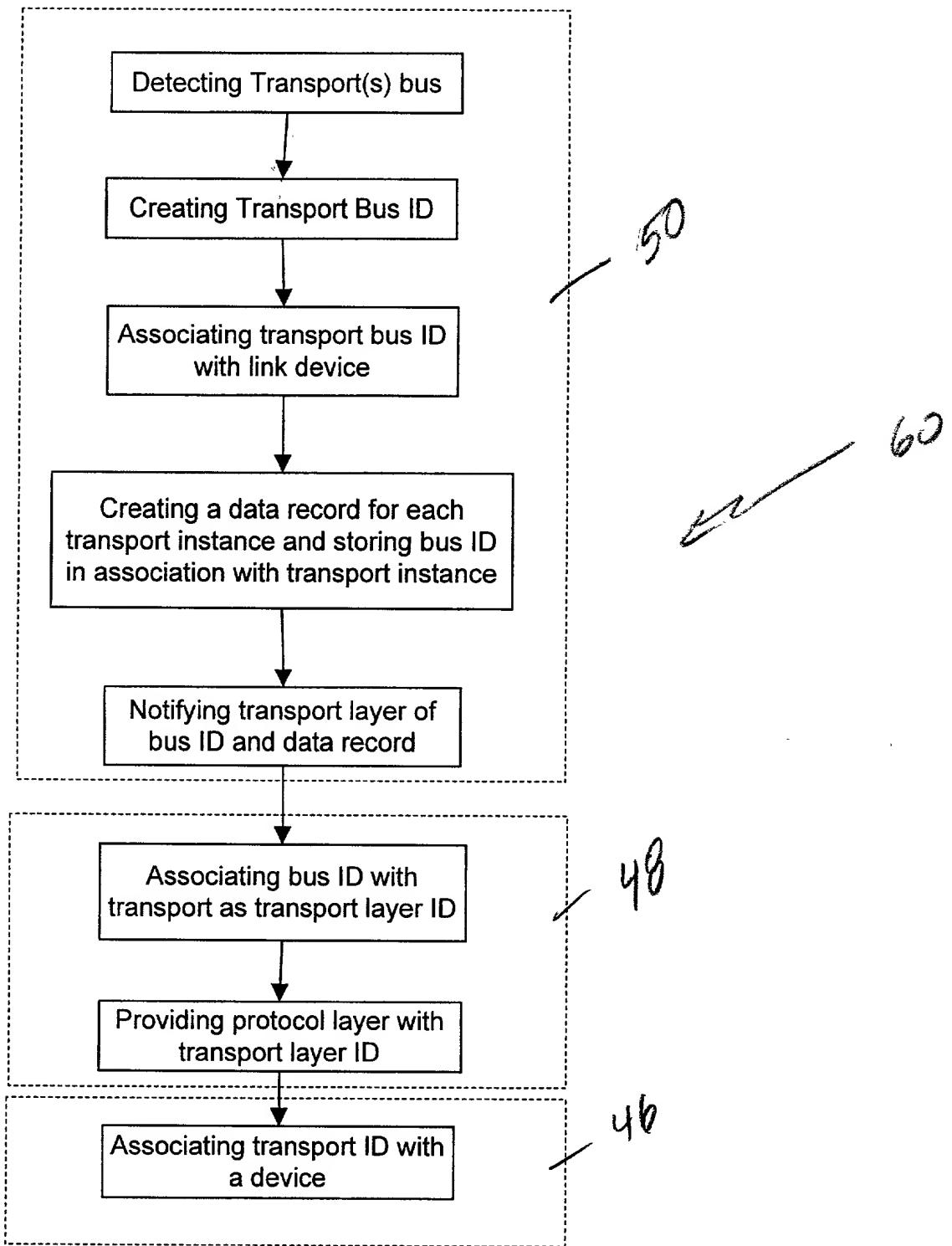


Fig. 4

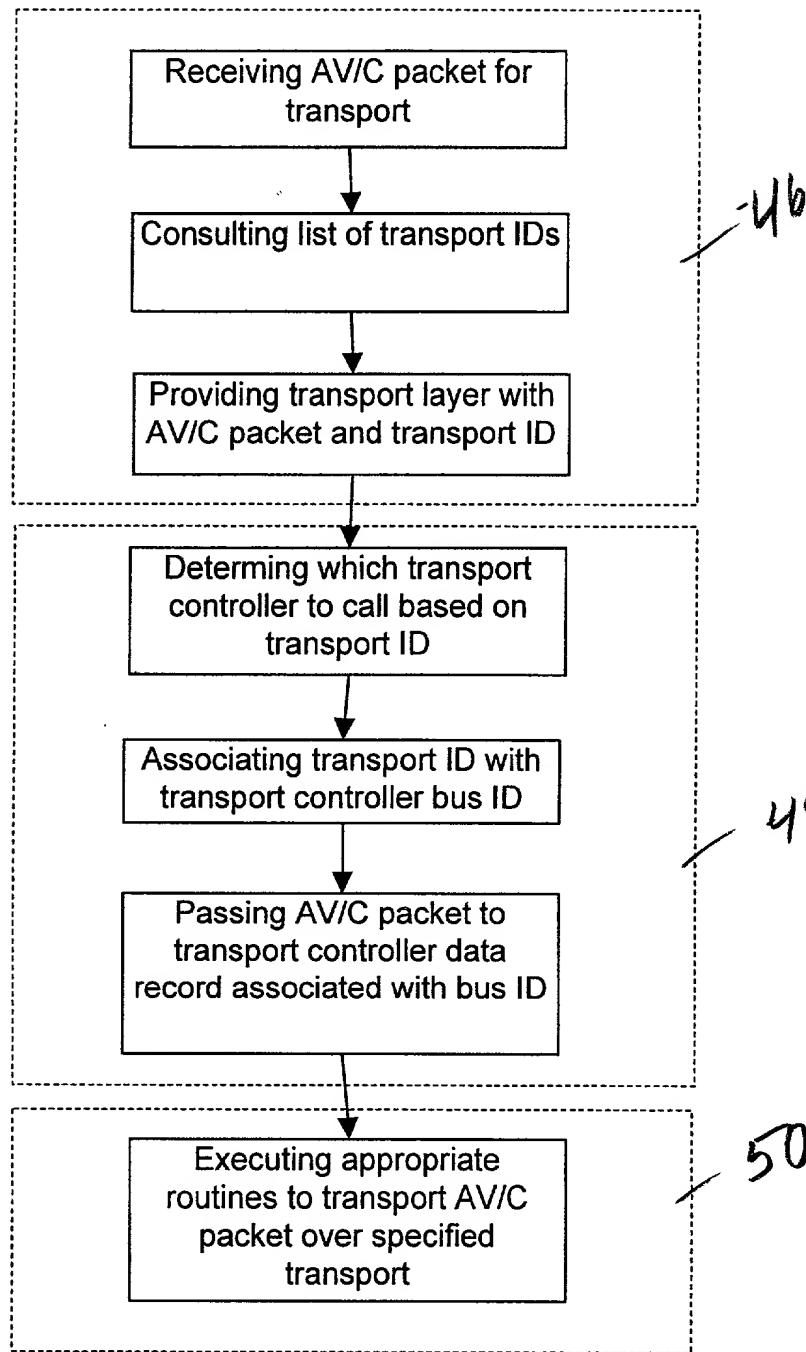


Fig. 5

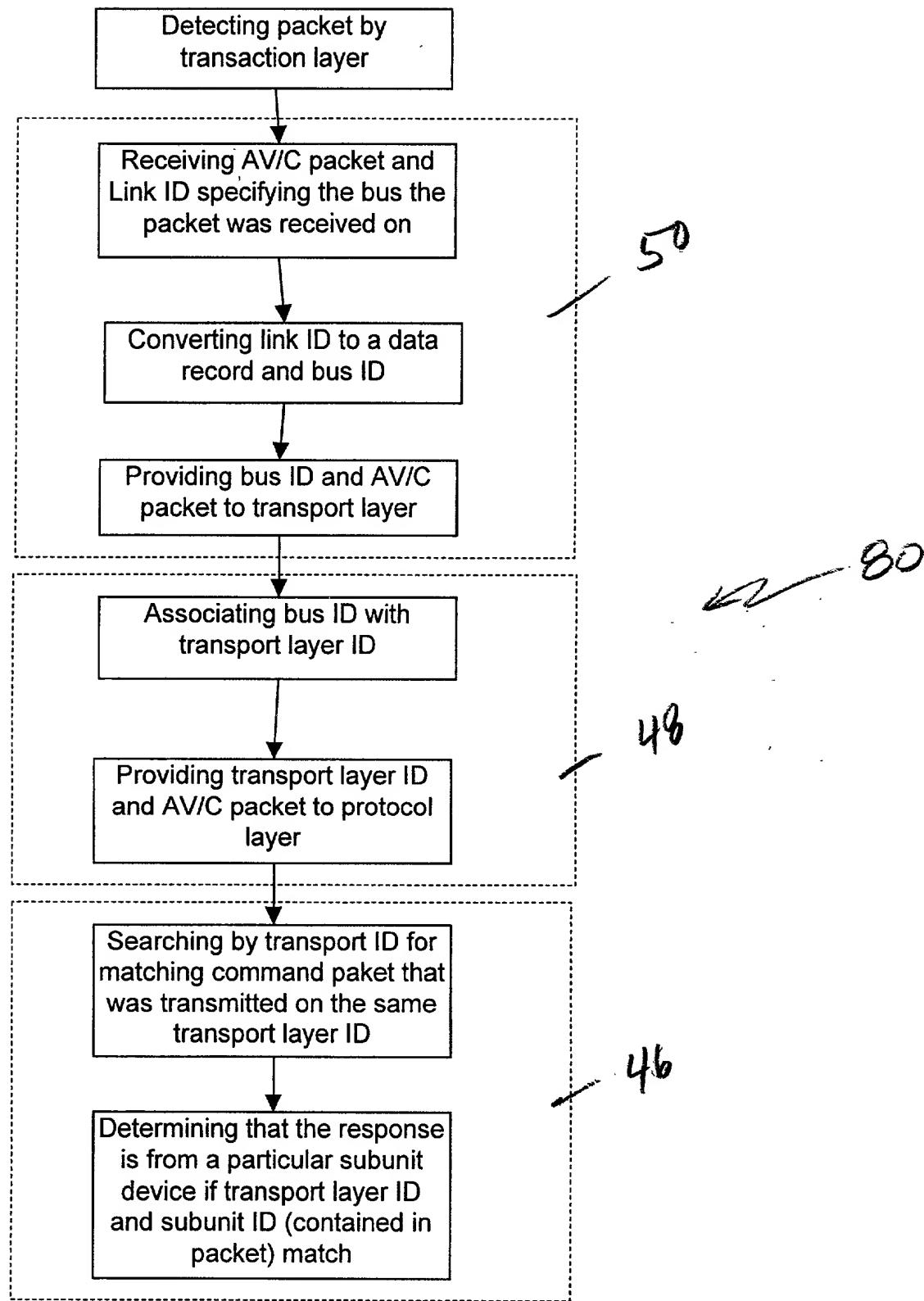


Fig. 6

DECLARATION & POWER OF ATTORNEY

As a below-named inventor, I hereby declare that:

My correct residence, post office address and citizenship are stated below next to my name.

I believe myself to be the original, first and sole inventor (if only one name is listed below) or an original and first joint inventor (if more than one name is listed below) of the subject matter which is disclosed and claimed and for which a patent is sought on the invention entitled:

"TRANSMISSION OF AV/C TRANSACTIONS OVER MULTIPLE TRANSPORTS METHOD AND APPARATUS"

The specification of this subject matter:

- is attached hereto.
- was filed on xxx;
- was assigned serial No. xxx;
- which was amended on _____.

I hereby state that I have reviewed and understand the contents of the above identified patent application, including the claims, as amended by any amendment(s) referred to above. I do not know and do not believe that the claimed invention was ever known or used in the United States of America before my invention thereof, or patented or described in any printed publication in any country before my invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, and that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months (for a utility patent application) or six months (for a design patent application) prior to this application.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with 37 C.F.R. §1.56(a).

I hereby claim foreign priority benefits under 35 U.S.C. §119 (a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Priority Claimed

| Number | Country | Month/Day/Year Filed | Yes | No |
|--------|---------|----------------------|-----|----|
| | | | | |
| | | | | |

I hereby claim the benefit under 35 U.S.C. §119(e) of any United States provisional application(s) listed below:

| Application Number | Filing Date |
|--------------------|-------------|
|--------------------|-------------|

| | |
|--------------------|-------------|
| Application Number | Filing Date |
|--------------------|-------------|

I hereby claim the benefit under 35 U.S.C. §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in these prior United States application(s) in the manner provided by 35 U.S.C. §112, I acknowledge the duty to disclose material information as defined in 37 C.F.R. §1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application.

| Application No. | Filing Date | Status (Issued, Pending, Abandoned) |
|-----------------|-------------|-------------------------------------|
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| Application No. | Filing Date | Status (Issued, Pending, Abandoned) |
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| Application No. | Filing Date | Status (Issued, Pending, Abandoned) |
|-----------------|-------------|-------------------------------------|

| | | |
|-----------------|-------------|-------------------------------------|
| Application No. | Filing Date | Status (Issued, Pending, Abandoned) |
|-----------------|-------------|-------------------------------------|

I hereby appoint Kenneth D'Alessandro, Registration No. 29,144; Timothy Brisson, Registration No.: 44,046; Michael Brandt, Registration No.: 39,119; Robert Hall, Registration No.: 39,209, Jonathan Velasco, Registration No.: 42,200, Michael Kerr, Registration No.: 42,722 and Victor Gallo, Registration No.: 41,768, as attorneys of record with full power of substitution and revocation, to prosecute this application and transact all business in the United States Patent and Trademark Office connected therewith, and certifies that it is the assignee of the entire right, title and interest in the patent application identified above by virtue of an assignment, a copy of which is attached, from the inventor(s) of the patent application identified above.

Please send all correspondence and direct all telephone calls to:

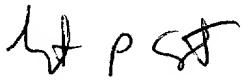
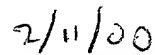
Victor J. Gallo
Sierra Patent Group, Ltd.
P.O. Box 6149
Stateline, NV 89449
Telephone (775) 586-9500

I, the undersigned, declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing therefrom.

DRAFTING ATTACHED

| | | | |
|---------------------------------------|-------------------|--------------------------|-------------------------|
| FULL NAME OF FIRST Name INVENTOR 1 | | MIDDLE Initial(s) | LAST Name |
| Erik | | P. | Staats |
| RESIDENCE AND Citizenship | City | State or Foreign Country | Country of |
| CITIZENSHIP | | | |
| POST OFFICE Code | Number and Street | City | State or Country |
| ADDRESS | 429 Bahr Drive | Ben Lomond | California Zip 95005 |

I further declare that all statements made herein of my own knowledge are true and that all statements made upon information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signature of Inventor 1

Date

by any person, other than an inventor who qualifies as an individual inventor pursuant to 37 C.F.R. §1.9(c), who could not qualify as a small business concern under 37 CFR 1.9(d) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).*

*Note: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27).

FULL NAME: Zayante, Inc.

ADDRESS: 269 Mt. Hermon Road, Suite 200, Scotts Valley, California 95066

Individual Small Business Concern Nonprofit Organization

FULL NAME:

ADDRESS:

Individual Small Business Concern Nonprofit Organization

FULL NAME:

ADDRESS:

Individual Small Business Concern Nonprofit Organization

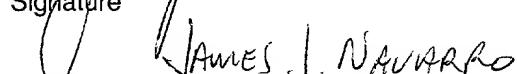
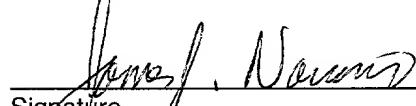
I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small business entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which the verified statement is directed.

Zayante, Inc.
269 Mt. Hermon Road, Suite 200
Scotts Valley, California 95066

Signature

Print Name



2-11-00

Date

CEO

Title